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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,466	03/29/2005	Sadayoshi Horii	123373	8082

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EXAMINER	
BUEKER, RICHARD R	
ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
04/07/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,466	HORII ET AL.	
	Examiner	Art Unit	
	Richard Bueker	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5 and 8-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5 and 8-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The restriction requirement has been removed in view of applicants' arguments.

Claims 1, 4, 5 and 8-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 1, 5 and 13, the phrase "the amount of the liquid source required for the one supply operation is controlled by the number of injection of the injecting operation" was not in the specification as originally filed, and is new matter.

Also, in claim 4, lines, 5 and 6, and claim 8, lines 3 and 4, the word "absorbed" is new matter. The specification as originally filed used the word "adsorbed", and the meaning of "absorbed" is not the same as the meaning of "adsorbed".

Claims 1, 4, 5 and 8-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 1, line 14, claim 5, lines 14 and 15, claim 13, line 11, the phrase "number of injection" is non-idiomatic, unclear and indefinite.

Claims 13 and 14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Versteeg (5,451,260) (see Figs. 1 and 2), who discloses a method of manufacturing a semiconductor device (see col. 1, lines 7-11 and col. 5, lines 50-56) comprising supplying a first reactant to a substrate, supplying a second reactant to the substrate (see col. 3, lines 3-23), and repeating

those steps a plurality of times, wherein both reactants contain a source gas obtained by vaporizing a liquid source in a vaporization section, and the liquid source is controlled such that it is intermittently injected to the vaporization section. Regarding the recited “one supply operation of the source gas to the substrate” it is noted that the claims do not define this phrase in any specific or limiting way, and the claims do not define the “one supply operation” to be the recited step of "supplying a source gas". "One supply operation" can properly be considered to describe the entire operation of supplying gas to the deposition reactor of Versteeg to form an entire film, including a plurality of steps of "supplying a source gas". In that case, each “one injecting operation” of a pulse of gas by Versteeg is smaller that the supply operation. Also, regarding the claim 14 limitation of removing extra gas, this is accomplished by the vacuum pump of Versteeg.

Claims 1 and 12-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Versteeg (5,451,260) taken in view of Senateur (5,945,162). Senateur (see Figs. 1 and 2) discloses a plural injector CVD apparatus analogous to that of Versteeg. Also, Senateur teaches (see col. 5, lines 5-17) that the injections can be made in successive, delayed injection steps, wherein the injectors are opened at different times. Therefore, Senateur teaches alternately repeating injection steps as now recited in claim 1, and it would have been prima facie obvious to utilize the alternating pattern of injection steps taught by Senateur in the process of Versteeg.

Claims 1 and 12-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Senateur (5,945,162). Senateur (see Figs. 1-3) discloses a method of manufacturing a semiconductor device comprising supplying a first reactant to a substrate, supplying a second reactant to the substrate, and repeating those steps a plurality of times, wherein both reactants contain a source gas obtained by vaporizing a liquid source in a vaporization section. Senateur teaches (see col. 5, lines 5-17) that the injections can be made in successive, delayed injection steps, wherein the injectors are opened at different times. Therefore, Senateur teaches alternately repeating injection steps as now recited in claim 1. Regarding the recited “one supply operation of the source gas to the substrate” it is noted that the claims do not define this phrase in any specific or limiting way, and the claims do not define the “one supply operation” to be the recited step of "supplying a source gas". "One supply operation" can properly be considered to describe the entire operation of supplying gas to the deposition reactor of Senateur to form an entire film, including a plurality of steps of "supplying a source gas". In that case, each “one injecting operation” of a pulse of gas by Senateur is smaller that the supply operation. Also, regarding the claim 14 limitation of removing extra gas, this is accomplished by the vacuum pump of Senateur.

Claims 1, 4, 5 and 8-14 are rejected under 35 U.S.C. 103(a) as obvious over Gauthier (6,132,515) taken in view of Raaijamakers (2001/0024387) and Posa (4,747,367). Gauthier (see the Fig.) discloses a semiconductor manufacturing apparatus comprising supplying a first reactant to a substrate, supplying a second

reactant to the substrate and repeating those steps a plurality of times, wherein one reactant contains a source gas obtained by vaporizing a liquid source in a vaporization section, and the liquid source is controlled such that it is intermittently injected to the vaporization section. Gauthier also discloses a substrate processing apparatus comprising a processing chamber, a liquid source container, a vaporizer, a liquid supply pipe for delivering liquid to the vaporizer, a vapor supply pipe, and an injection controller for controlling the flow rate of liquid to the vaporizer to intermittently inject liquid to the vaporizer. Gauthier doesn't discuss supplying the two reactants alternately for a plurality of times, or performing an ALD process.

Raaijamakers provides a disclosure of the known ALD process, and he teaches (see paragraph 91) that an apparatus such as that of Posa can be used for forming ALD layers. As shown in Figs. 1 and 2 of Posa, his reactor system is designed to form a large number of alternating layers by gas switching. Posa teaches that the vapor source used in his apparatus is a conventional vaporizer (see the vaporizer 56 of Fig. 1 of Posa) that produces a steady-state vapor flow through supply pipe 20 to the CVD reactor 22. The vapor flow into the reaction chamber 22 is switched in an alternating manner to form the gas pulses through the coating chamber. It would have been obvious to one skilled in the art to use a conventional prior art vaporizer such as that of Gauthier to supply the steady-state vapor flow that is required by Posa's coating chamber, because Gauthier teaches that his vaporizer provides a desirably steady flow of vapor. Also, because Raaijamakers teaches that Posa's apparatus can be used for

an ALD process, it would have been obvious to use Posa's apparatus for ALD, while using Gauthier's vaporizer to provide the necessary steady-state vapor stream.

Applicants have argued that Versteeg and Gauthier don't teach the newly added "alternately" limitation. It is noted, however, That Senateur and Raaijamakers do teach this limitation, and it would have been obvious to utilize the apparatus of Versteeg or Gauthier to practice a process of supplying reactants alternately, in view of the teachings of Senateur or Raaijamakers.

Applicants have also argued that Versteeg and Gauthier do not teach that a decreased temperature can be restored, as taught by applicants' specification. It is noted, however, that this limitation is not in the presently pending claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Richard Bueker/
Primary Examiner
Art Unit 1792